Reference Manual

PlantPAx
Process Automation System

Rockwell Automation Library of Process Objects: Discrete Output (P_DOut)

Version 3.1

Allen-Bradley • Rockwell Software

Rockwell Automation

Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

	WARNING: Identifies information about practices or circumstances that may cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
	ATTENTION: Identifies information about practices or circumstances may lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

Labels may also be on or inside the equipment to provide specific precautions.

	SHOCK HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.
	BURN HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.
	ARC FLASH HAZARD: Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

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Notes:

This document is updated throughout for version 3.1 of the Rockwell Automation Library of Process Objects. Changes for this revision are marked by change bars shown in the right margin.

Software Compatibility and Content Revision

Table 1 - Summary of Changes

Topic	Page
Changed title from 'PlantPAx Library of Process Objects' to 'Rockwell Automation Library of Process Objects'	Front Cover
Changed version of Rockwell Automation Library of Process Objects from 3.0 to 3.1	5, 9, 10
Changed references to Knowledgebase Answer ID 62682 to Product Compatibility and Download Center	5,
Visualization Files added Important note concerning the order in which files must be imported File Types table - added optional files	 9 10
Input Parameters table: added 'Alias For' column and aliases added 'MCmd_Acq' and 'MCmd_Rel' parameters 'Cfg_IOFaultSeverity' - changed level 4 alarm severity from 'Highest' to 'Urgent' changed description for 'PCmd_Acq', 'PCmd_Rel', 'PCmd_Lock', 'PCmd_Unlock', 'PCmd_Reset', 'PCmd_On', 'PCmd_Off', 'PCmd_OnPulse', 'PCmd_OffPulse', and 'PCmd_ContPulse' changed Alarm Severity from 1…4 to 1…1000	11
Output Parameters table: added 'Alias For' column and aliases added 'SrcQ_', 'Nrdy_', 'Err_', Ack_', 'and Alm_', parameter descriptions to bullet list added 'SrcQ_IO', 'SrcQ', 'Sts_MAcqRcvd' and 8 'Nrdy_' parameters 'Val_Notify' - changed level 4 alarm severity from 'Highest' to 'Urgent'	15
Operations - added Simulation section	21
Status/Quality indicators table: added symbols and descriptions for 'I/O Uncertain' and 'Device disabled' added list of conditions under which Device Not Ready indicator appears changed level 4 alarm severity from 'Highest' to 'Urgent' changed Alarm Severity from 1…4 to 1…1000	24
Alarm Indicators - changed level 4 alarm severity from 'Highest' to 'Urgent'	27
Faceplates: replaced images for Tabs, Operator, Maintenance, Engineering, and Alarms to include new Diagnostics tab	30, 35, 38, 44
Operator tab: added Interlock/Permissive condition table added Alarm Locations image	33
Engineering tab - changed 'Mode Configuration Message Box' to 'Mode Configuration Display'	38, 39
Diagnostics tab - added new section	43
Alarm Severity Color Definitions table - changed level 4 alarm severity from 'Highest' to 'Urgent'	45

For the latest compatible software information and to download the Rockwell Automation Library of Process Objects, see the Product Compatibility and Download Center at http://www.rockwellautomation.com/rockwellautomation/support/pcdc.page.

For general library considerations, see Rockwell Automation Library of Process Objects, publication PROCES-RM002.

Additional Resources

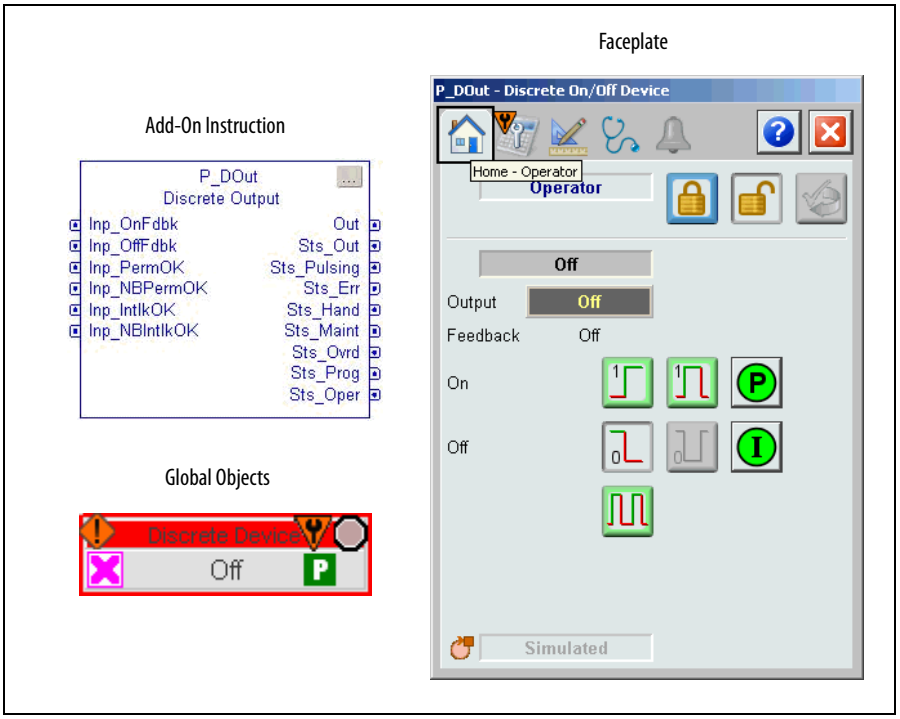
These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
PlantPAx Process Automation System Selection Guide, publication PROCES-SG001	Provides information to assist with equipment procurement for your PlantPAx system.
PlantPAx Process Automation System Reference Manual, publication PROCES-RM001	Provides characterized recommendations for implementing your PlantPAx system.
Rockwell Automation Library of Process Objects, publication PROCES-RM002	Provides general considerations for the PlantPAx system library of process objects.
FactoryTalk View Machine Edition User Manual, publication VIEWME-UM004	Provides details on how to use this software package for creating an automation application.
FactoryTalk View Site Edition User Manual, publication VIEWSE-UM006	Provides details on how to use this software package for developing and running human-machine interface (HMI) applications that can involve multiple users and servers, distributed over a network.
Logix5000™ Controllers Add-On Instructions Programming Manual, publication 1756-PM010	Provides information for designing, configuring, and programming Add-On Instructions.
Rockwell Automation Library of Process Objects: Common Alarm Block (P_Alarm) Reference Manual, publication SYSLIB-RM002	Details how to monitor an input condition to raise an alarm. Information includes acknowledging, resetting, inhibiting, and disabling an alarm.
Rockwell Automation Library of Process Objects: Interlocks with First Out and Bypass (P_Intlk) Reference Manual, publication SYSLIB-RM004	Explains how to collect (sum up) the interlock conditions that stop or de-energize a running or energized piece of equipment or prevent it from starting or being energized.
Process Add-On Instructions: Standard Modes (P_Mode) Reference Manual, publication SYSLIB-RM005	Explains how to select the Mode (owner) of an instruction or control strategy. The Mode instruction is usually embedded within other instructions to extend their functionality. It is possible to use a standalone Mode instruction to enhance a program where modes are wanted.
Rockwell Automation Library of Process Objects: Permissives with Bypass (P_Perm) Reference Manual, publication SYSLIB-RM007	Details how to collect permissive conditions to start a piece of equipment.

You can view or download publications at http:/www.rockwellautomation.com/literature/. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Discrete Output (P_DOut)

The Discrete Output (P_DOut) Add-On Instruction controls a device by a single discrete output signal and optionally monitors feedback from the device to check for device failures. The P_DOut instruction operates in a variety of modes, and can provide steady, single pulsed, or continually pulsed output. The global objects and faceplate shown below are examples of the graphical interface tools for this Add-On Instruction.



Guidelines

Use this instruction in these situations:

- You need to operate a device by using a single discrete output and that device is not supported by other Rockwell Automation Library of Process Objects Add-On Instructions (such as for various motors, valves, and so forth).
- You have a device, such as a valve or motor, that is supported by other Add-On Instructions, but you want the device to use non-standard state names, such as 'recycle' and 'deliver' for a diverter valve, rather than the fixed names used in the other instruction, such as 'closed' and 'open'. The P_DOut instruction has configurable names for each of the device states.
- You need to operate a device that requires pulsing (single-pulse or continuous). The P_DOut instruction provides on-delay timing, off-delay timing, and commands for single On pulse, single Off pulse, and continuous pulse stream (with pulse completion when changing to steady state), in addition to On and Off. For example, the P_DOut instruction can be a good choice for pilot lights or stack lights that require blinking.

Do **not** use this instruction in these situations:

- You need to operate a device that has more than one discrete output or more than two discrete inputs for device feedback. Refer also to the P_D4SD (Discrete 2-, 3- or 4-State Device) or P_nPos (n-Position Device) Instruction.
- You need to operate a single-speed motor, solenoid valve, or other device that is better supported by other Rockwell Automation Library of Process Objects Add-On Instructions. P_Motor and P_ValveSO Instructions, for example, more closely model the device under control and can provide better diagnostics for the device.
- You need to operate a continuously-variable device. Use the P_AOut (analog output), P_ValveC (control valve) or P_VSD (variable speed drive) Instruction instead.

Functional Description

The P_DOut instruction provides the following capabilities:

- Controls one discrete output, with configurable text labels for the On and Off states of the output.
- Provides Operator and Program commands to set the output state to On or Off, to pulse the output On once, to pulse the output Off once, or to set the output to a continuous pulsing operation. Pulse times (on-time and off-time) are configurable.
- Monitors two discrete feedback inputs, monitoring the actual position of the device.
- Detects failure to reach the target state, after a configurable time, and alarms the failure when the feedback inputs are used. Optionally 'sheds' to the de-energized state on a feedback failure.
- Monitors Permissive conditions that enable commanding the device to the On state.
- Monitors Interlock conditions that return the device to its de-energized state (Off).
- Provides simulation of a normally working device, while holding the output to the real device de-energized, for use in testing or operator training.
- Monitors I/O communication status and alarms on an I/O fault. Optionally 'sheds' to the de-energized state on an I/O fault condition.
- Provides an 'Available' status when in Program mode and operating normally for use by automation logic to determine if the logic can manipulate the device.
- Operates in Operator, Program, Override, Maintenance, and Hand modes. (See Modes on page 20.)

Required Files

Add-On Instructions are reusable code objects that contain encapsulated logic that can streamline implementing your system. This lets you create your own instruction set for programming logic as a supplement to the instruction set provided natively in the ControlLogix® firmware. An Add-On Instruction is defined once in each controller project, and can be instantiated multiple times in your application code as needed.

Controller File

The P_DOut_3_1-**00**_AOI.L5X Add-On Instruction must be imported into the controller project to be used in the controller configuration. The service release number (boldfaced) can change as service revisions are created.

Visualization Files

The following files for this Add-On Instruction can be downloaded from the Product Compatibility and Download Center at http://www.rockwellautomation.com/rockwellautomation/support/pcdc.page.

IMPORTANT Files must be imported in the following order: image files, then global object files, and then graphic files. This order is required to properly configure the visualization files.

Table 2 - P_DOut Visualization File Types

Application Type	File Type	FactoryTalk View SE Software	FactoryTalk View ME Software	Description
Graphics - Displays	GFX	(RA-BAS) P_DOut-Faceplate	(RA-BAS-ME) P_DOut-Faceplate	The faceplate display used for the object.
		(RA-BAS) P_DOut-Help	(RA-BAS-ME) P_DOut-Help.gfx	The P_DOut Help display.
		(RA-BAS) P_DOut-Quick	(RA-BAS-ME) P_DOut-Quick.gfx	The Quick display used for the object.
		(RA-BAS) Common-AnalogEdit	N/A	Faceplate used for analog input data entry. The FactoryTalk View ME faceplates use the native analog input data entry so no file is required.
		(RA-BAS) P_Alarm-Faceplate	(RA-BAS-ME) P_Alarm-Faceplate	The alarm faceplate display used for the object.
		(RA-BAS) P_Alarm-Help	(RA-BAS-ME) P_Alarm-Help	P_Alarm Help information that is accessed from the P_DOut Help display.
		(RA-BAS) P_Mode-Help	(RA-BAS-ME) P_Mode-Help	P_Mode Help information that is accessed from the P_DOut Help display.
		(RA-BAS) P_Mode-Config	(RA-BAS-ME) P_Mode-Config	Display used to set Default mode.

Table 2 - P_DOut Visualization File Types

Application Type	File Type	FactoryTalk View SE Software	FactoryTalk View ME Software	Description
Optional Graphic Displays	GFX	(RA-BAS) P_Intlk-Faceplate	(RA-BAS-ME) P_Intlk-Faceplate	The interlock faceplate display used for the object. Use this file if your Discrete Output has an associated P_Intlk object and you enable navigation to its faceplate from the Discrete Output faceplate.
		(RA-BAS) P_IntlkPerm-Help	(RA-BAS-ME) P_IntlkPerm-Help	Interlock/Permissive Help information that is accessed from the P_DOut Help display. Use this file if you use the Discrete Output Interlock/Permissive faceplate.
		(RA-BAS) P_Perm-Faceplate	(RA-BAS-ME) P_Perm-Faceplate	The Permissive faceplate display used for the object. Use this file if your Discrete Output has an associated P_Perm object and you enable navigation to its faceplate from the Discrete Output faceplate.
Graphics - Global Objects	GGFX	(RA-BAS) P_DOut Graphics Library	(RA-BAS-ME) P_DOut Graphics Library	P_DOut graphic objects used to build process displays.
		(RA-BAS) Common Faceplate Objects	(RA-BAS-ME) Common Faceplate Objects	Common global objects used on Process Object faceplates.
		(RA-BAS) Process Alarm Objects	(RA-BAS-ME) Process Alarm Objects	Global objects used for managing alarms on Process Object faceplates.
		(RA-BAS) Process Help Objects	(RA-BAS-ME) Process Help Objects	Global objects used for help on Process Objects help displays.
		(RA-BAS) Process Faceplate Misc Objects	(RA-BAS-ME) Process Faceplate Misc Objects	Global objects used on miscellaneous process object faceplates.
		(RA-BAS) Process Mode Objects	(RA-BAS-ME) Process Mode Objects	Global objects used for managing modes on Process Object faceplates.
		(RA-BAS) Process Interlock Objects	(RA-BAS-ME) Process Interlock Objects	Global objects used for managing interlocks and permissives on Process Object faceplates.
Graphics - Images	PNG	All .png files in the images folder	All .png files in the images folder	These are the common icons used in the global objects and faceplates for all Process Objects. When PNG graphic formats are imported they are renamed like a BMP file but retain a PNG format.
HMI Tags	CSV	N/A	FTVME_PlantPAxLib_Tags_3_1_**00**.csv (1)	These tags must be imported into the FactoryTalk View ME project to support switching tabs on any Process Object faceplate.

(1) The service release number (boldfaced) can change as service revisions are created.

Controller Code

This section describes the parameter references for this Add-On Instruction.

Discrete Output Instruction Input Structure

Input parameters include the following:

- Input data elements (Inp_) are typically used to connect field inputs from I/O modules or signals from other objects.
- Configuration data elements (Cfg_) are used to set configurable capabilities and features of the instruction.
- Command data elements (PCmd_, OCmd_, MCmd_) are used by program logic, operators, and maintenance personnel to request instruction actions.
- Setting data elements (PSet_) are used by program logic to establish runtime setpoints, thresholds, and so forth.

Table 3 - P_DOut Input Parameters

Input Parameter	Data Type	Alias For	Default	Description
EnableIn	BOOL		1	**Ladder Diagram:** If the rung-in condition is true, the instruction's Logic routine executes. If the rung-in condition is false, the instruction's EnableInFalse routine executes. **Function Block Diagram:** If true, or not connected, the instruction's Logic routine executes. If the parameter is exposed as a pin and wired, and the pin is false, the instruction's EnableInFalse routine executes. **Structured Text:** No effect. The instruction's Logic routine executes.
Inp_OnFdbk	BOOL		0	Input signal: On feedback from device; 1 = Device confirmed On.
Inp_OffFdbk	BOOL		0	Input signal: Off feedback from device; 1 = Device confirmed Off.
Inp_PermOK	BOOL		1	1 = On permissives OK, device can turn On.
Inp_NBPermOK	BOOL		1	1 = Non-bypassable On permissives OK, device can turn On.
Inp_IntlkOK	BOOL		1	1 = Interlocks OK, device can turn On and stay On.
Inp_NBIntlkOK	BOOL		1	1 = Non-bypassable interlocks OK, device can turn On and stay On.
Inp_IOFault	BOOL		0	I/O communication status: 0 = OK 1 = Fail
Inp_Sim	BOOL		0	Simulation input. When set to 1, the instruction simulates a working device while keeping the output de-energized. When set to 0, the instruction operates the device normally.
Inp_Hand	BOOL	Mode.Inp_Hand	0	1 = Select Hand (hard-wired) mode.
Inp_Ovrd	BOOL	Mode.Inp_Ovrd	0	1 = Select Override mode.
Inp_OvrdCmd	DINT		0	Override device command: 0 = None 1 = Off 2 = On 3 = Pulse off 4 = Pulse on 5 = Pulse continuously
Inp_Reset	BOOL		0	Input parameter used to programatically reset alarms. When set to 1, all alarms requiring reset are reset.

Table 3 - P_DOut Input Parameters

Input Parameter	Data Type	Alias For	Default	Description
Cfg_CompletePulse	BOOL		0	1 = Finish pulse in progress when commanded ON or Off. 0 = Switch immediately to ON or OFF state when commanded.
Cfg_HasOnFdbk	BOOL		0	1 = Device provides an On feedback signal.
Cfg_HasOffFdbk	BOOL		0	1 = Device provides an Off feedback signal.
Cfg_UseOnFdbk	BOOL		0	1 = Use Device On or Off feedback for failure checking.
Cfg_UseOffFdbk				
Cfg_FdbkFail	BOOL		0	1 = Both feedbacks On is invalid. 0 = Both feedbacks Off is invalid.
Cfg_HasPermObj	BOOL		0	1 = Tells HMI a permissive object (for example, P_Perm) is used for Inp_PermOK and navigation to the permissive object's faceplate is enabled. **IMPORTANT**: The name of the Permissive object in the controller must be this object's name with the suffix '_Perm'. For example, if your P_DOut object has the name 'DOut123', then its Permissive object must be named 'DOut123_Perm'.
Cfg_HasIntlkObj	BOOL		0	1 = Tells HMI an interlock object (for example, P_Intlk) is used for Inp_IntlkOK and navigation to the interlock object's faceplate is enabled. **IMPORTANT:** The name of the interlock object in the controller must be this object's name with the suffix '_Intlk'. For example, if your P_DOut object has the name 'DOut 123', then its interlock object must be named 'DOut 123_Intlk'.
Cfg_PCmdClear	BOOL	Mode.Cfg_PCmdClear	1	When this parameter is 1, program commands are cleared once they are acted upon. When set to 0, program commands remain set until cleared by the application program logic. **IMPORTANT:** Clearing this parameter online can cause unintended program command execution.
Cfg_ProgDefault	BOOL	Mode.Cfg_ProgDefault	0	This parameter defines the default mode. When this parameter is 1, the mode defaults to Program if no mode is being requested. When this parameter is 0, the mode defaults to Operator if no mode is being requested. **IMPORTANT:** Changing this parameter online can cause unintended mode changes.
Cfg_OperOffPrio	BOOL		0	1 = OCmd_Off has priority, accepted any time. 0 = OCmd_Off only in Operator and Maintenance mode.
Cfg_OCmdResets	BOOL		0	1 = New Operator state command resets fault. 0 = Reset required to clear fault.
Cfg_OvrdPermIntlk	BOOL		0	1 = Override ignores bypassable permissives/interlocks. 0 = Always use permissives/interlocks.
Cfg_ShedOnFail	BOOL		1	1 = Go to OFF State and alarm on Fail to reach position. 0 = Alarm only on Fail. **IMPORTANT:** If a condition is configured to shed the device to the Off state on a fault, a reset is required to clear the shed fault to command the device to a state other than Off.
Cfg_ShedOnIOFault	BOOL		1	1 = Go to OFF State and alarm on I/O Fault. 0 = Alarm only on I/O Fault. **IMPORTANT:** If a condition is configured to shed the device to the Off state on a fault, a reset is required to clear the shed fault to command the device to a state other than Off.
Cfg_HasOnFailAlm	BOOL	OnFail.Cfg_Exists	0	These parameters determine whether the corresponding alarm exists and is checked or if the alarm does not exist and is not used. When these parameters are 1, the corresponding alarm exists.
Cfg_HasOffFailAlm		OffFail.Cfg_Exists		
Cfg_HasIntlkTripAlm		IntlkTrip.Cfg_Exists		
Cfg_HasIOFaultAlm		IOFault.Cfg_Exists		

Table 3 - P_DOut Input Parameters

Input Parameter	Data Type	Alias For	Default	Description
Cfg_OnFailResetReqd	BOOL	OnFail.Cfg_ResetReqd	0	These parameters determine whether a reset is required to clear the alarm status. When these parameters are 1, the alarm is latched ON when the alarm occurs. After the alarm condition returns to normal, a reset is required to clear the alarm status (for example, OCmd_Reset, Inp_Reset, or Fail.OCmd_Reset is required to clear Alm_Fail alarm after the alarm is set and the value returns to normal). When this parameter is 0, no reset is required and the alarm status is cleared when the alarm condition returns to normal. **IMPORTANT:** If the reset clears the alarm, it also acknowledges the alarm.
Cfg_OffFailResetReqd		OffFail.Cfg_ResetReqd		
Cfg_IntlkTripResetReqd		IntlkTrip.Cfg_ResetReqd		
Cfg_IOFaultResetReqd		IOFault.Cfg_ResetReqd		
Cfg_OnFailAckReqd	BOOL	OnFail.Cfg_AckReqd	1	These parameters determine whether an acknowledgement is required for an alarm. When these parameters are 1, the acknowledge (ack) bit is cleared when the alarm occurs. An acknowledge command (for example, PCmd_FailAck or Fail.OCmd_Ack) is required to acknowledge the alarm. When set to 0, the Acknowledge bit is set when an alarm occurs indicating an acknowledged alarm and no acknowledge command is required.
Cfg_OffFailAckReqd		OffFail.Cfg_AckReqd		
Cfg_IntlkTripAckReqd		IntlkTrip.Cfg_AckReqd		
Cfg_IOFaultAckReqd		IOFault.Cfg_AckReqd		
Cfg_OnFailSeverity	INT	OnFail.Cfg_Severity	1000	These parameters determine the severity of each alarm. This drives the color and symbol that are used to indicate alarm status on the faceplate and global object. The following are valid values: 1…250 = Low 251…500 = Medium 501…750 = High 751…1000 = Urgent **IMPORTANT:** For FactoryTalk View software, version 7.0, these severity parameters drive only the indication on the global object and faceplate. The Alarms and Event definition severity drives the color and symbol that is used on the alarm banner and alarm summary as well as the value returned by FactoryTalk Alarms and Events display commands.
Cfg_OffFailSeverity		OffFail.Cfg_Severity	1000	
Cfg_IntlkTripSeverity		IntlkTrip.Cfg_Severity	500	
Cfg_IOFaultSeverity		IOFault.Cfg_Severity	1000	
Cfg_SimFdbkT	DINT		2	Delay to echo back of On/Off status when in simulation (seconds).
Cfg_OnDelayT	REAL		0.0	Delay before initially turning output On or Off (seconds).
Cfg_OffDelayT				
Cfg_OnPulseT	REAL		0.5	Output On time for pulse On or pulse continuous (seconds).
Cfg_OffPulseT	REAL		0.5	Output Off time for pulse Off or pulse continuous (seconds).
Cfg_OnFailT	DINT		10	Time after output On to get On feedback before fault (seconds).
Cfg_OffFailT	DINT		10	Time after output Off to get Off feedback before fault (seconds).
PSet_Owner	DINT		0	Program owner request ID (non-zero) or release (zero).
PCmd_On	BOOL		0	When Cfg_PCmdClear is 1: • Set PCmd_On to 1 to turn the device on – While the device is on, set PCmd_OffPulse to 1 to pulse the device off once • Set PCmd_Off to 1 to turn the device off – While the device is off, set PCmd_OnPulse to 1 to pulse the device on once • Set PCmd_ContPulse to 1 to pulse the device continuously (blink) • These parameters reset Automatically When Cfg_PCmdClear is 0: • Set PCmd_On to 1 to turn the device on – While the device is on, set PCmd_OffPulse to 1 to pulse the device off once – While the device is on, set PCmd_ContPulse to 1 to pulse the device continuously (blink) • Set PCmd_On to 0 to turn the device off – While the device is off, set PCmd_OnPulse to 1 to pulse the device on once – While the device is off, set PCmd_ContPulse to 1 to pulse the device continuously (blink) • PCmd_Off is not used • The AOI clears PCmd_OffPulse and PCmd_OnPulse when they are used, the remaining parameters do not reset automatically
PCmd_Off				
PCmd_OnPulse				
PCmd_OffPulse				
PCmd_ContPulse				

Table 3 - P_DOut Input Parameters

Input Parameter	Data Type	Alias For	Default	Description
PCmd_Acq	BOOL	Mode.PCmd_Acq	0	When Cfg_PCmdClear is 1: • Set PCmd_Acq to 1 to Acquire • Set PCmd_Rel to 1 to Release • These parameters reset automatically When Cfg_PCmdClear is 0: • Set PCmd_Acq to 1 to Acquire • Set PCmd_Acq to 0 to Release • PCmd_Rel is not used • These parameters do not reset automatically
PCmd_Rel		Mode.PCmd_Rel		
PCmd_Lock	BOOL	Mode.PCmd_Lock	0	When Cfg_PCmdClear is 1: • Set PCmd_Lock to 1 to Lock • Set PCmd_Unlock to 1 to Unlock • These parameters reset automatically When Cfg_PCmdClear is 0: • Set PCmd_Lock to 1 to Lock • Set PCmd_Lock to 0 to Unlock • PCmd_Unlock is not used • These parameters do not reset automatically
PCmd_Unlock		Mode.PCmd_Unlock		
PCmd_Reset	BOOL		0	• Set PCmd_Reset to 1 to reset all alarms requiring reset • This parameter is always reset automatically
PCmd_OnFailAck	BOOL	OnFail.PCmd_Ack	0	• Set PCmd_<Alarm>Ack to 1 to Acknowledge alarm • The parameter is reset automatically
PCmd_OffFailAck		OffFail.PCmd_Ack		
PCmd_IntlkTripAck		IntlkTrip.PCmd_Ack		
PCmd_IOFaultAck		IOFault.PCmd_Ack		
PCmd_OnFailSuppress	BOOL	OnFail.PCmd_Suppress	0	When Cfg_PCmdClear is 1: • Set PCmd_<Alarm>Suppress to 1 to suppress alarm • Set PCmd_<Alarm>Unsuppress to 1 to unsuppress alarm • These parameters reset automatically When Cfg_PCmdClear is 0: • Set PCmd_<Alarm>Suppress to 1 to suppress alarm • Set PCmd_<Alarm>Suppress to 0 to unsuppress alarm • PCmd_<Alarm>Unsuppress is not used • These Parameters do not reset automaticallyS
PCmd_OffFailSuppress		OffFail.PCmd_Suppress		
PCmd_IntlkTripSuppress		IntlkTrip.PCmd_Suppress		
PCmd_IOFaultSuppress		IOFault.PCmd_Suppress		
PCmd_OnFailUnsuppress		OnFail.PCmd_Unsuppress		
PCmd_OffFailUnsuppress		OffFail.PCmd_Unsuppress		
PCmd_IntlkTripUnsuppress		IntlkTrip.PCmd_Unsuppress		
PCmd_IOFaultUnsuppress		IOFault.PCmd_Unsuppress		
PCmd_OnFailUnshelve	BOOL	OnFail.PCmd_Unshelve	0	• Set PCmd_<Alarm>Unshelve to 1 to Unshelve alarm • The parameter is reset automatically
PCmd_OffFailUnshelve		OffFail.PCmd_Unshelve		
PCmd_IntlkTripUnshelve		IntlkTrip.PCmd_Unshelve		
PCmd_IOFaultUnshelve		IOFault.PCmd_Unshelve		
OCmd_On	BOOL		0	Operator command to turn device On.
OCmd_Off	BOOL		0	Operator command to turn device Off.
OCmd_OnPulse	BOOL		0	Operator command to pulse device that is Off, On once.
OCmd_OffPulse	BOOL		0	Operator command to pulse device that is On, Off once.
OCmd_ContPulse	BOOL		0	Operator command to pulse device continuously (blink).
OCmd_Bypass	BOOL		0	Operator command to bypass all bypassable interlocks and permissives.
OCmd_Check	BOOL		0	Operator command to check (not bypass) all interlocks and permissives.
MCmd_Disable	BOOL		0	Maintenance command to disable device.
MCmd_Enable	BOOL		0	Maintenance command to enable (allow to turn On) device.

Table 3 - P_DOut Input Parameters

Input Parameter	Data Type	Alias For	Default	Description
MCmd_Acq	BOOL	Mode.MCmd_Acq	0	Maintenance command to acquire ownership (Operator/Program/Override to Maintenance)
MCmd_Rel	BOOL	Mode.MCmd_Rel	0	Maintenance command to release ownership (Maintenance to Operator/Program/Override)
OCmd_AcqLock	BOOL	Mode.OCmd_AcqLock	0	Operator command to acquire (Program to Operator)/Lock Ownership.
OCmd_Unlock	BOOL	Mode.OCmd_UnlockRel	0	Operator command to unlock/release (Operator to Program) Ownership.
OCmd_Reset	BOOL		0	Operator command to reset all alarms requiring reset.
OCmd_ResetAckAll	BOOL		0	Operator command to reset and acknowledge all alarms and latched shed conditions.

Discrete Output Instruction Output Structure

Output parameters include the following:

- Value data elements (Val_) are numeric outputs of the instruction for use by the HMI. Values can also be used by other application logic or software packages.
- Source and Quality data elements (SrcQ_) are outputs of the instruction used by the HMI to indicate PV source and quality.
- Status data elements (Sts_) are bit outputs of the instruction for use by the HMI. Status bits can also be used by other application logic.
- Error data elements (Err_) are outputs of the instruction that indicate a particular configuration error. If any Err_ bit is set then the Sts_Err configuration error summary status is set and the Invalid Configuration indicator is displayed on the HMI.
- Not Ready data elements (Nrdy_) are bit outputs of the instruction for use by the HMI for displaying the Device Not Ready indicator. These bits can also be used by other application logic.
- Alarm data elements (Alm_) are outputs of the instruction that indicate a particular alarm has occurred.
- Acknowledge data elements (Ack_) are outputs of the instruction that indicate the corresponding alarm has been acknowledged.
- Ready data elements (Rdy_) are bit outputs of the instruction used by the HMI to enable and disable Command buttons and Setting entry fields.

Table 4 - P_DOut Output Parameters

Output Parameter	Data Type	Alias For	Description
EnableOut	BOOL		Enable output: The EnableOut signal is not manipulated by this instruction. Its output state always reflects EnableIn input state.
Out	BOOL		Primary output: 1 = On 0 = Off

Table 4 - P_DOut Output Parameters

Output Parameter	Data Type	Alias For	Description
SrcQ_IO	SINT		I/O signal source and quality.
SrcQ			Final device status source and quality. GOOD 0 = I/O live and confirmed good quality 1 = I/O live and assumed good quality 2 = No feedback configured, assumed good quality TEST 8 = Device simulated 9 = Device loopback simulation 10 = Manually entered value UNCERTAIN 16 = Live input, off-specification 17 = Value substituted at device/bus 18 = Value substituted by maintenance (Has and not Use) 19 = Shed, using last good value 20 = Shed, using replacement value BAD 32 = Signal failure (out-of-range, NaN, invalid combination) 33 = I/O channel fault 34 = I/O module fault 35 = Bad I/O configuration (for example, scaling parameters)
Val_Cmd	SINT		Device command: 0 = None 1 = Off 2 = On 3 = Pulse off 4 = Pulse on 5 = Pulse continuously
Val_Fdbk	SINT		Device feedback: 0 = Transition 1 = Off 2 = On 3 = Invalid
Val_Sts	SINT		Device status: 0 = Off 1 = On 2 = Pulse off 3 = Pulse on 4 = Pulse continuously 5 = Turning off 6 = Turning on 33 = Disabled
Val_Fault	SINT		Device fault status: 0 = None 16 = Feedback fault 32 = I/O Fault 34 = Configuration error
Val_State	SINT		Internal logic state (for animating state diagram on faceplate).

Table 4 - P_DOut Output Parameters

Output Parameter	Data Type	Alias For	Description
Val_Mode	SINT	Mode.Val	The current mode is shown with status bits and also as an enumeration 'Val_Mode' as follows: 0 = No mode 1 = Hand 2 = Maintenance 3 = Override 4 = Program (locked) 5 = Operator (locked) 6 = Program (unlocked, Operator is default) 7 = Operator (unlocked, Program is default) 8 = Program (unlocked, Program is default) 9 = Operator (unlocked, Operator is default)
Val_Owner	DINT		Current object owner ID (0 = not owned).
Val_Notify	SINT		Current alarm level and acknowledgement (enumeration): 0 = No alarm 1 = Alarm cleared: a reset or acknowledge is required 2 = Low (acknowledged) 3 = Low (unacknowledged) 4 = Medium (acknowledged) 5 = Medium (unacknowledged) 6 = High (acknowledged) 7 = High (unacknowledged) 8 = Urgent (acknowledged) 9 = Urgent (unacknowledged)
Sts_Out	BOOL		1 = Output is On (energized). 0 = Output is Off (de-energized).
Sts_Pulsing	BOOL		1 = Output is in a pulsing sequence.
Sts_FdbkOff	BOOL		1 = Device feedback shows device in Off state.
Sts_FdbkOn	BOOL		1 = Device feedback shows device in On state.
Sts_FdbkFail	BOOL		1 = Feedbacks are in an Invalid state (not ON, OFF, or Transition).
Sts_Available	BOOL		1 = Device available for control by automation (Program).
Sts_Bypass	BOOL		1 = Bypassable interlocks and permissives are bypassed.
Sts_BypActive	BOOL		1 = Interlock /permissive bypassing active (bypassed or maintenance).
Sts_Disabled	BOOL		1 = Device is disabled (output held Off).
Sts_NotRdy	BOOL		1 = Device is not ready to be operated.
Nrdy_Disabled	BOOL		1 = Device Not Ready: • Device disabled by Maintenance • Configuration Error • Interlock Not OK • Permissive Not OK • Operator State 0 Priority command requires reset • Device Failure (shed requires reset) • I/O Fault (shed requires reset) • Device Logic Disabled/NO Mode
Nrdy_CfgErr			
Nrdy_Intlk			
Nrdy_Perm			
Nrdy_OperPrio			
Nrdy_Fail			
Nrdy_IOFault			
Nrdy_NoMode			
Sts_MaintByp	BOOL		1 = Device has a maintenance bypass function active.
Sts_AlmInh	BOOL		1 = One or more alarms shelved, disabled or suppressed.
Sts_Err	BOOL		1 = Error in configuration: See detail bits for reason.

Table 4 - P_DOut Output Parameters

Output Parameter	Data Type	Alias For	Description
Err_Timer	BOOL		1 = Error in configuration: • Feedback check timer preset invalid (use 0…2,147,483). • Simulation timer preset (use 0 …2,147,483). • Alarm minimum On time or severity.
Err_Sim	BOOL		
Err_Alarm	BOOL		
Sts_Hand	BOOL	Mode.Sts_Hand	1 = Mode is Hand (supersedes Operator, Program, Override, or Maintenance), Maintenance (supersedes Operator, Program, or Override), Override (supersedes Operator or Program), Program (auto), or Operator (manual).
Sts_Maint		Mode.Sts_Maint	
Sts_Ovrd		Mode.Sts_Ovrd	
Sts_Prog		Mode.Sts_Prog	
Sts_Oper		Mode.Sts_Oper	
Sts_ProgOperLock	BOOL	Mode.Sts_ProgOperLock	1 = Program or Operator has requested mode lock.
Sts_NoMode	BOOL	Mode.Sts_NoMode	1 = No mode (disabled because EnableIn is false).
Sts_MAcq_Rcvd	BOOL	Mode.Sts_MAcq_Rcvd	1 = Maintenance Acquire command received this scan.
Sts_OnFail	BOOL	OnFail.Inp	1 = Device failed to turn On.
Sts_OffFail		OffFail.Inp	1 = Device failed to turn Off.
Sts_IntlkTrip		IntlkTrip.Inp	1 = Device turned Off by an interlock Not OK (one-shot).
Sts_IOFault		IOFault.Inp	I/O communication fault status: 0 = OK 1 = Bad
Alm_OnFail	BOOL	OnFail.Alm	1 = Device failed to Turn On alarm.
Alm_OffFail		OffFail.Alm	1 = Device failed to turn Off alarm.
Alm_IntlkTrip		IntlkTrip.Alm	1 = Alarm: device turned Off by an interlock Not OK.
Alm_IOFault		IOFault.Alm	1 = I/O Fault alarm.
Ack_OnFail	BOOL	OnFail.Ack	1 = Fail to turn On alarm is acknowledged.
Ack_OffFail		OffFail.Ack	1 = Fail to turn Off alarm is acknowledged.
Ack_IntlkTrip		IntlkTrip.Ack	1 = Interlock trip alarm is acknowledged.
Ack_IOFault		IOFault.Ack	1 = I/O Fault alarm is acknowledged.
Sts_OnFailDisabled	BOOL	OnFail.Disabled	1 = Fail to turn On alarm is disabled (by Maintenance).
Sts_OffFailDisabled		OffFail.Disabled	1 = Fail to turn Off alarm is disabled (by Maintenance).
Sts_IntlkTripDisabled		IntlkTrip.Disabled	1 = Interlock trip alarm is disabled (by Maintenance).
Sts_IOFaultDisabled		IOFault.Disabled	1 = I/O Fault alarm is disabled (by Maintenance).
Sts_OnFailShelved	BOOL	OnFail.Shelved	1 = Fail to turn On alarm is shelved by Operator
Sts_OffFailShelved		OffFail.Shelved	1 = Fail to turn Off alarm is shelved by Operator.
Sts_IntlkTripShelved		IntlkTrip.Shelved	1 = Interlock trip alarm is shelved by Operator.
Sts_IOFaultShelved		IOFault.Shelved	1 = I/O Fault alarm is shelved by Operator.
Sts_OnFailSuppressed	BOOL	OnFail.Suppressed	1 = Fail to turn On alarm is suppressed (by Program).
Sts_OffFailSuppressed		OffFail.Suppressed	1 = Fail to turn Off alarm is suppressed (by Program).
Sts_IntlkTripSuppressed		IntlkTrip.Suppressed	1 = Interlock trip alarm is suppressed (by Program).
Sts_IOFaultSuppressed		IOFault.Suppressed	1 = I/O Fault alarm is suppressed (by Program).

Table 4 - P_DOut Output Parameters

Output Parameter	Data Type	Alias For	Description
Rdy_On	BOOL		1 = Ready to receive OCmd: On, Off, OnPulse, OffPulse, ContPulse, Bypass, or Check (enables HMI button).
Rdy_Off			
Rdy_OnPulse			
Rdy_OffPulse			
Rdy_ContPulse			
Rdy_Bypass			
Rdy_Check			
Rdy_Disable	BOOL		1 = Ready to receive MCmd_Disable (enables HMI button).
Rdy_Enable	BOOL		1 = Ready to receive MCmd_Enable (enables HMI button).
Rdy_Reset	BOOL		1 = At least one alarm or latched shed requires reset.
Rdy_ResetAckAll	BOOL		1 = At least one alarm or latched shed condition requires reset or acknowledgement.
P_DOut	BOOL		Unique parameter name for auto-discovery.

Discrete Output Instruction Local Configuration Tags

Configuration parameters that are arrayed, string, or structure data types cannot be configured as parameters for Add-On Instructions. Configuration parameters of these types appear as local tags to the Add-On Instruction. Local tags can be configured through the HMI faceplates or in RSLogix 5000 software by opening the Instruction Logic of the Add-On Instruction instance and then opening the Data Monitor on a local tag. These parameters cannot be modified by using controller logic or RSLogix 5000 software export/import functionality.

Table 5 - P_DOut Local Configuration Tags

Tag Name	Data Type	Default	Description
Cfg_0StText	STRING_8	'Off'	Text to display when device is in Off (0) state.
Cfg_1StText	STRING_8	'On'	Text to display when device is in On (1) state.
Cfg_Desc	STRING_40	'Discrete On/Off Device'	Description for display on HMI. The string shows in the title bar of the faceplate.
Cfg_Label	STRING_20	'Discrete Device'	Label for graphic symbol displayed on HMI. This string appears on the graphic symbol.
Cfg_Tag	STRING_20	'P_DOut'	Description for display on HMI. The string shows in the title bar of the faceplate.

Operations

This section describes the primary operations for Add-On Instructions.

Modes

The P_DOut Add-On Instruction uses the following standard modes, implemented by using an embedded P_Mode Add-On Instruction.

Graphic Symbol	Description
Operator mode	Control of the device is owned by the Operator. Operator Commands (OCmd_) and Operator Settings (OSet_) from the HMI are accepted.
Program mode	Control of the device is owned by Program logic. Program Commands (PCmd_) and Program Settings (PSet_) are accepted.
Override mode	Control of the device is owned by priority logic, superseding Operator and Program control. Override Inputs (Inp_OvrdCmd and other Inp_OvrdXxxx values) are accepted. If so configured, bypassable interlocks and permissives are bypassed.
Maintenance mode	Control of the device is owned by Maintenance. Operator Commands and Settings from the HMI are accepted. Bypassable interlocks and permissives are bypassed, and device timeout checks are not processed.
Hand mode	Control of the device is owned by hardwired logic or other logic outside the instruction. The instruction tracks the state of the device for bumpless transfer back to one of the other modes.
No mode	The device is disabled and has no owner because the EnableIn input is false. The main instruction Logic routine is not being scanned. See Execution for more information on EnableInFalse processing.

Refer to the Rockwell Automation Library of Process Objects: Common Mode Block (P_Mode) Reference Manual, publication SYSLIB-RM005, for more information.

Alarms

The P_DOut instruction uses the following alarms, implemented by using embedded P_Alarm Add-On Instructions.

Alarm	P_Alarm Name	Description
Interlock Trip	IntlkTrip	Triggered when an Interlock not OK causes the device to transition from the On state or a pulsing operation to the Off state.
I/O Fault	IOFault	Triggered by the Inp_IOFault Input, usually used to indicate an I/O communication failure. The device can be configured to 'shed' to the Off state on an I/O Fault.
Off Fail	OffFail	Triggered when the device is commanded Off, but device feedback does not confirm the device is Off within the configured time. The OffFail Status/Alarm has a configurable time (Cfg_OffFailT) so the device feedbacks can show the device reached the Off state before declaring a failure.
On Fail	OnFail	Triggered when the device is commanded On, but device feedback does not confirm the device is On within the configured time. The OnFail Status/Alarm has a configurable time (Cfg_OnFailT) so the device feedbacks can show the device reached the On state before declaring a failure.

Refer to the Rockwell Automation Library of Process Objects: Common Alarm Block (P_Alarm) Reference Manual, publication SYSLIB-RM002, for more information.

Simulation

Simulation in P_DOut de-energizes the output and simulates providing feedback of a working device. You can test the operation of the instruction under controlled conditions.

You must set the Inp_Sim parameter in the controller to '1' to enable simulation.

The Simulation icon is displayed at the bottom left of the Operator faceplate indicating the device is in simulation.

You can use Cfg_SimFdbkT to delay the echo of the On/Off status of the device.

When you have finished in simulation, set the Inp_Sim parameter in the controller to '0'. The output is re-energized and feedback is enabled.

Execution

The following table explains the handling of instruction execution conditions.

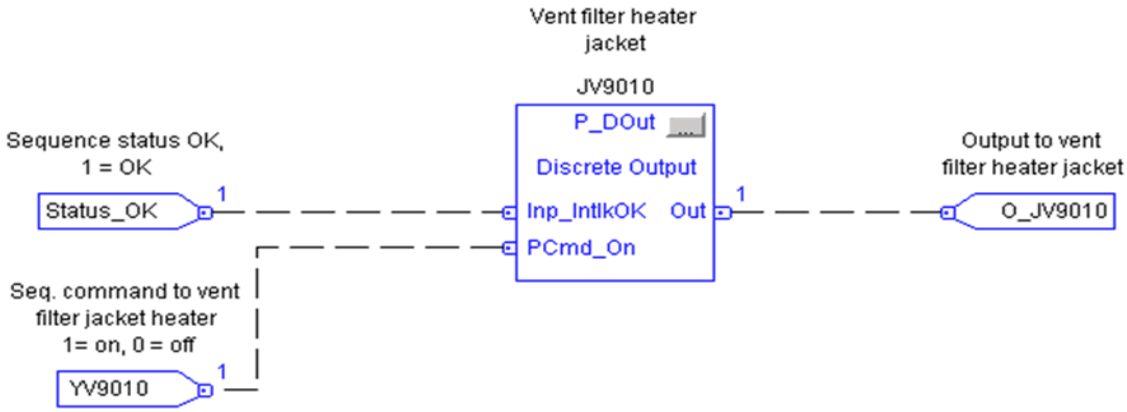
Condition	Description
EnableIn False (false rung)	Handled the same as if the device were Disabled by Command. The device output is de-energized and the device is shown as Disabled on the HMI. The mode is shown as 'NO MODE'. All alarms are cleared.
Powerup (prescan, first scan)	On Prescan, any Commands received before First Scan are discarded. The device is de-energized. On first scan, the device is treated as if it were returning from Hand mode: the instruction state is set based on the feedback received from the device. Embedded P_Mode and P_Alarm instructions are handled in accordance with their standard powerup procedures. Refer to the P_Mode and P-Alarm reference manuals for details.
Postscan	No SFC Postscan logic is provided.

Refer to the Logix5000 Controllers Add-On Instructions Programming Manual, publication 1756-PM010, for more information.

Programming Example

This example uses the P_DOut instruction to control a heating jacket on a vent filter. The heating jacket is being used in this case to keep the vent filter dry when there is potential for condensate buildup.

In this example, the vent filter heater jacket does not provide the feedback on its status. In normal operating conditions, the vent filter heater jacket is being commanded on or off by the control sequence configured in the controller. If the operating status of the sequence is not OK, always command the vent filter off.



In this example, the controlling sequence issues a single bit for the desired state of the vent filter heater. The parameter P_CmdOn is connected to this bit to command the vent filter heater on and off. The parameter Cfg_PCmdClear is set to 0, indicating that the command bit does not need reset by the instruction. This setting also indicates that the P_DOut instruction acts upon P_CmdOn based on value (level) instead of acting only on transition to true (edge) so that P_CmdOn can be used to command both the On and Off states.

The controlling sequence could be written to set the command bits P_CmdOn and P_CmdOff directly (for example, by using structured text within a SFC), in which case Cfg_PCmdClear could be left at its default of 1 to cause the instruction to clear the commands once they have been acted upon.

The parameter Cfg_ProgDefault is set to 1 to indicate that the normal operating state of the controller is Program, meaning it is normally commanded by the control sequence.

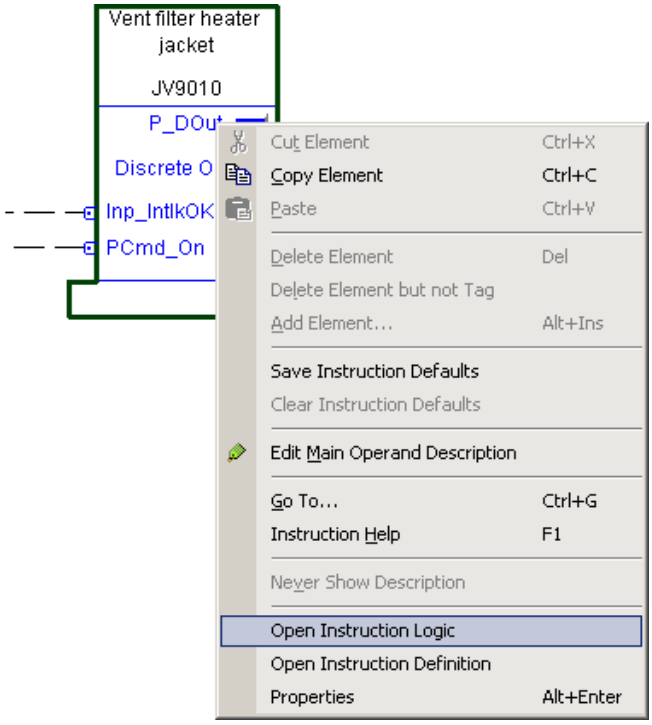
The status of the sequence is connected to the Inp_IntlkOK parameter so that the output to the vent filter heater jacket is always off when the skid is not operating properly, even if the instruction is not in Program mode.

The parameters Cfg_HasOnFdbk and Cfg_HasOffFdbk are both set to 0 to indicate that the vent filter heater jacket does not provide feedback on its status. The parameter Cfg_HasOnFailAlm, Cfg_HasOffFailAlm, Cfg_HasIntlkTripAlm, and Cfg_HasIOFaultAlm are all set to 0, indicating that no alarms are necessary for this device.

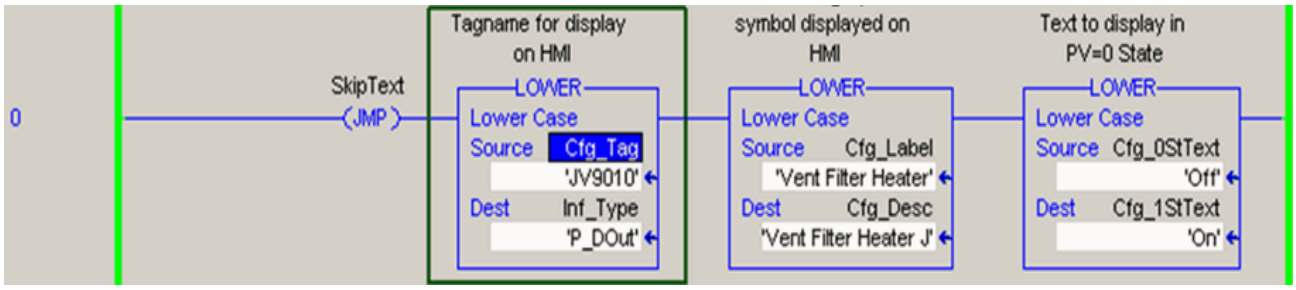
Lastly, configure the following local configuration tags to drive the text on the HMI faceplate. In this example, the vent filter P&ID tag is JV9010. In this example, they are set as follows:

Cfg_Tag:	'JV9010'
Cfg_Label:	'Vent Filter Heater'
Cfg_Desc:	'Vent Filter Heater Jacket'
Cfg_St0Text:	'Off'
Cfg_St1Text:	'On'

Local tags can be configured through the HMI faceplates or in RSLogix 5000 software by opening the Instruction Logic of the Add-On Instruction instance and then selecting the string on the displayed rung.



All of the strings in local tags are shown on the first rung of the Add-On Instruction's Logic routine for your convenience.



Display Elements

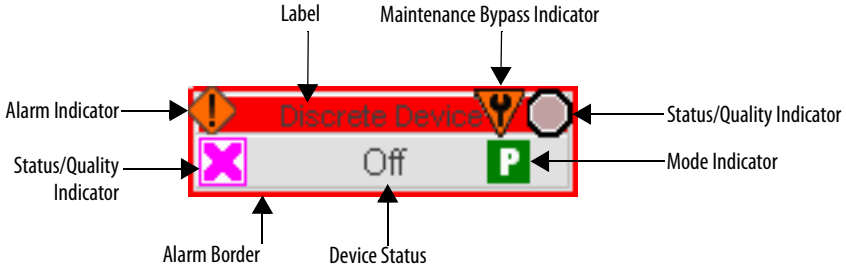
A display element (global object) is created once and can be referenced multiple times on multiple displays in an application. When changes are made to the original (base) object, the instantiated copies (reference objects) are automatically updated. Use of global objects, in conjunction with tag structures in the ControlLogix system, aid consistency and save time.

Table 6 - P_DOut Display Elements Description

Display Element Name	Display Element	Description
GO_P_DOut		Digital (2-state) device display element for use on overview and detail displays.

Common attributes of the P_DOut global objects include the following:

- Device Status
- Status/Quality indicators
- Maintenance Bypass indicator
- Mode indicator
- Label
- Color changing label background and alarm border that blink on unacknowledged alarm
- Alarm indicator that changes color with the severity of an alarm



Status/Quality Indicators

One of these symbols appears to the left of the graphic symbol when the described condition is true.

Table 7 - Status/Quality Indicators

Graphic Symbol	Description
	Invalid configuration.
	I/O Fault.
	I/O uncertain.

Table 7 - Status/Quality Indicators

Graphic Symbol	Description
	The device is not ready to operate.
	The device is disabled.
No symbol displayed	I/O quality good and configuration valid.

TIP When the Invalid Configuration Indicator appears, you can find what configuration setting is invalid by following the indicators. Click the graphic symbol to open the faceplate. The Invalid Configuration indicator appears next to the appropriate tab at the top of the faceplate to guide you in finding the configuration error. Once you navigate to the tab, the misconfigured item is flagged with this indicator or appear in a magenta box.

For the Discrete Output instruction, the Invalid Configuration indicator appears under the following conditions:

- The output's On Delay, Off Delay, On Pulse, Off Pulse, On Failure Check, or Off Failure Check time is set to a value less than zero or greater than 2,147,483 seconds.
- The simulated feedback time is set to a value less than zero or greater than 2,147,483 seconds.
- An Alarm Minimum On Time is set to a value less than zero or greater than 2,147,483 seconds.
- Alarm Severity is set to a value less than 1 or greater than 1000.

TIP When the Not Ready indicator appears, you can find what condition is preventing operation by following the indicators. Click the graphic symbol to open the faceplate. The Not Ready indicator appears next to the appropriate tab at the top of the faceplate to guide you in finding the condition. When you navigate to the tab, the condition preventing operation is flagged.

For the Discrete Output instruction, the Device Not Ready indicator appears under the following conditions:

- The device has been disabled by Maintenance.
- There is a configuration error.
- An interlock or permissive is not OK.
- The Operator State 0 priority command requires reset.
- There is a Device failure or I/O Fault and shed requires reset.
- The device logic is disabled or there is no mode.

Maintenance Bypass Indicator

This symbol appears to the right of the Label to indicate that a Maintenance Bypass has been activated.

Graphic Symbol	Description
	A Maintenance Bypass is active.
No symbol displayed	No Maintenance Bypass active.

TIP When the Maintenance Bypass Indicator appears, you can find what condition was bypassed by following the indicators. Click the graphic symbol to open the faceplate. The Maintenance Bypass Indicator appears next to the appropriate tab at the top of the faceplate to guide you in finding the bypass. Once you navigate to the tab, the bypassed item is flagged with this indicator.

For the Discrete Output instruction, the Maintenance Bypass Indicator appears under the following conditions:

- A feedback input that Engineering has configured to exist has been set by Maintenance to not be used.
- Maintenance has bypassed the bypassable interlocks and permissives.

Mode Indicators

One of these symbols appears to the right of the graphic symbol to indicate the mode of the device instruction

Table 8 - P_DOut Mode Indicators

Graphic Symbol	Description
Transparent	Operator mode (if the default mode is Operator and in Operator mode, the mode indicator is transparent)
	Operator mode (if the default mode is Program)
	Operator mode locked
Transparent	Program mode (if the default mode is Program and in Program mode, the mode indicator is transparent)
	Program mode (if the default mode is Operator)
	Program mode locked
	Override mode

Table 8 - P_DOut Mode Indicators

Graphic Symbol	Description
	Maintenance mode
	Hand mode
	No mode

TIP The images provided for the Operator and Program default modes are completely transparent; therefore, no mode indicators appear if the device is in its default mode. This behavior can be changed by replacing these mode indicators with images that are not completely transparent.

Refer to the Rockwell Automation Library of Process Objects: Common Mode Block (P_Mode) Reference Manual, publication SYSLIB-RM005, for more information.

Alarm Indicators

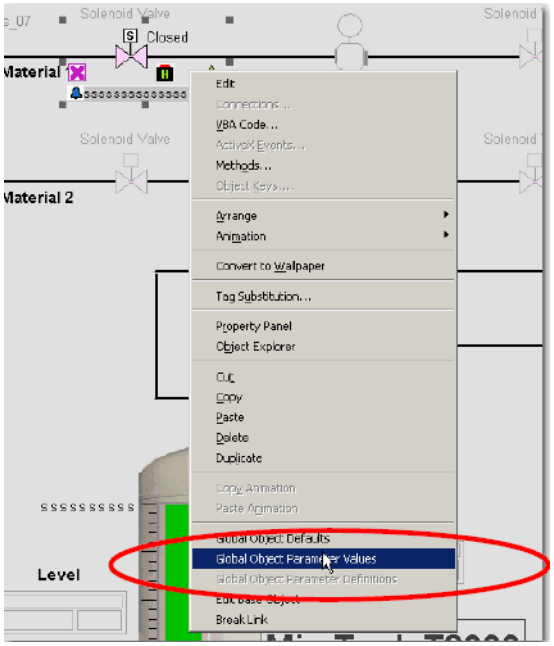
One of these symbols appears to the left of the Label to indicate the described alarm condition. The alarm border and label background blink if Acknowledgement of an alarm condition is required.

Symbol	Border and Label Background	Description
	No change in color	Alarm Inhibit: an alarm is suppressed by the Program, disabled by Maintenance, or shelved by the Operator.
	White	Return to normal (no alarm condition), but a previous alarm has not been acknowledged.
	Blue	Low severity alarm.
	Yellow	Medium severity alarm.
	Red	High severity alarm.
	Magenta	Urgent severity alarm.
No symbol	No change in color	No alarm or alarm inhibit condition, and all alarms are acknowledged.

Using Display Elements

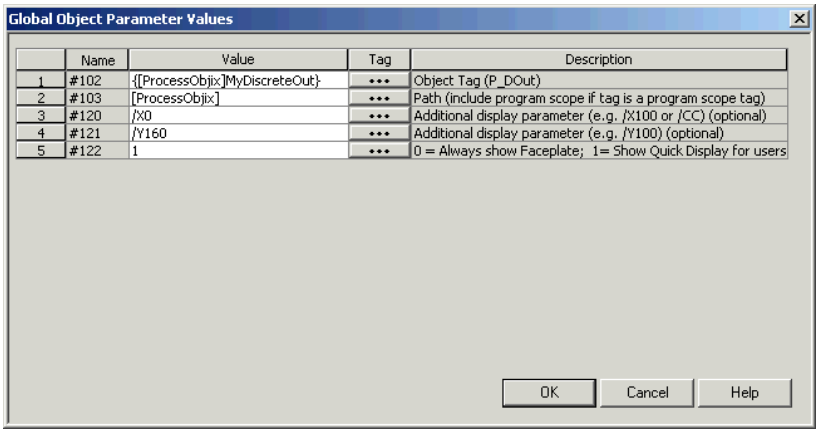
The global objects for P_DOut can be found in the global object file (RA-BAS) P_DOut Graphics Library.ggfx. Do the following to use a global object.

1. Copy it from the global object file and paste it in the display file.



2. In the display, right-click the global object and choose Global Object Parameter Values.

   The Global Object Parameter Values dialog box appears.


Global Object Parameter Values
Name
Value
Tag
Description
1 #102 {[ProcessObjix]MyDiscreteOut} ••• Object Tag (P_DOut)
2 #103 [ProcessObjix] ••• Path (include program scope if tag is a program scope tag)
3 #120 /X0 ••• Additional display parameter (e.g. /X100 or /CC) (optional)
4 #121 /Y160 ••• Additional display parameter (e.g. /Y100) (optional)
5 #122 1 ••• 0 = Always show Faceplate; 1= Show Quick Display for users
OK
Cancel
Help

The global object parameters are as follows.

Parameter	Required	Description
#102	Y	Object tag to point to the name of the associated object Add-On Instruction in the controller.
#103	Y	Path used for display navigation features to other objects. Include program scope if tag is a program scope tag.
#120	N	Additional parameter to pass to the display command to open the faceplate. Typically used to define position for the faceplate.
#121	N	Additional parameter to pass to the display command to open the faceplate. if defining X and Y coordinate, separate parameters so that X is defined by #120 and Y is defined by #121. This lets the same parameters be used in subsequent display commands originating from the faceplate.
#122	Y	These are the options for the global object display: 0 = Always show faceplate 1 = Show Quick Display for users without Maintenance access (Code C) 2 = Always show Quick Display

3. Type the tag or value in the Value column as specified in the Description column.

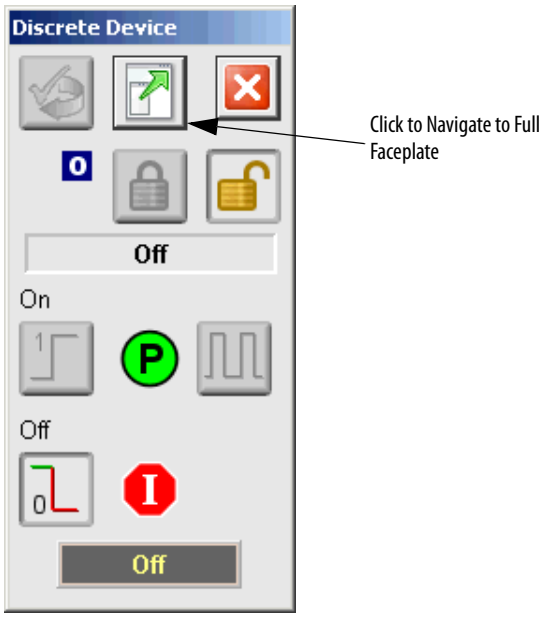
   TIP You can click the ellipsis (. . .) to browse and select a tag.

   Values for items marked '(optional)' can be left blank.

4. Click OK.

Quick Display

The Quick Display screen provides means for operators to perform simple interactions with the P_DOut instruction instance. From the Quick Display, you can navigate to the faceplate for full access for operation, maintenance, and configuration for operation, maintenance, and configuration.

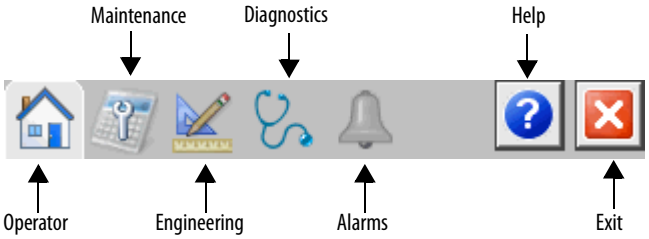


Faceplate

The P_DOut faceplate consists of five tabs and each tab consists of one or more pages.

The faceplate contains the value of local configuration tags Cfg_Tag and Cfg_Desc in the title bar.

The Operator tab is displayed when the faceplate is initially opened. Click the appropriate icon at the top of the faceplate to access a specific tab.



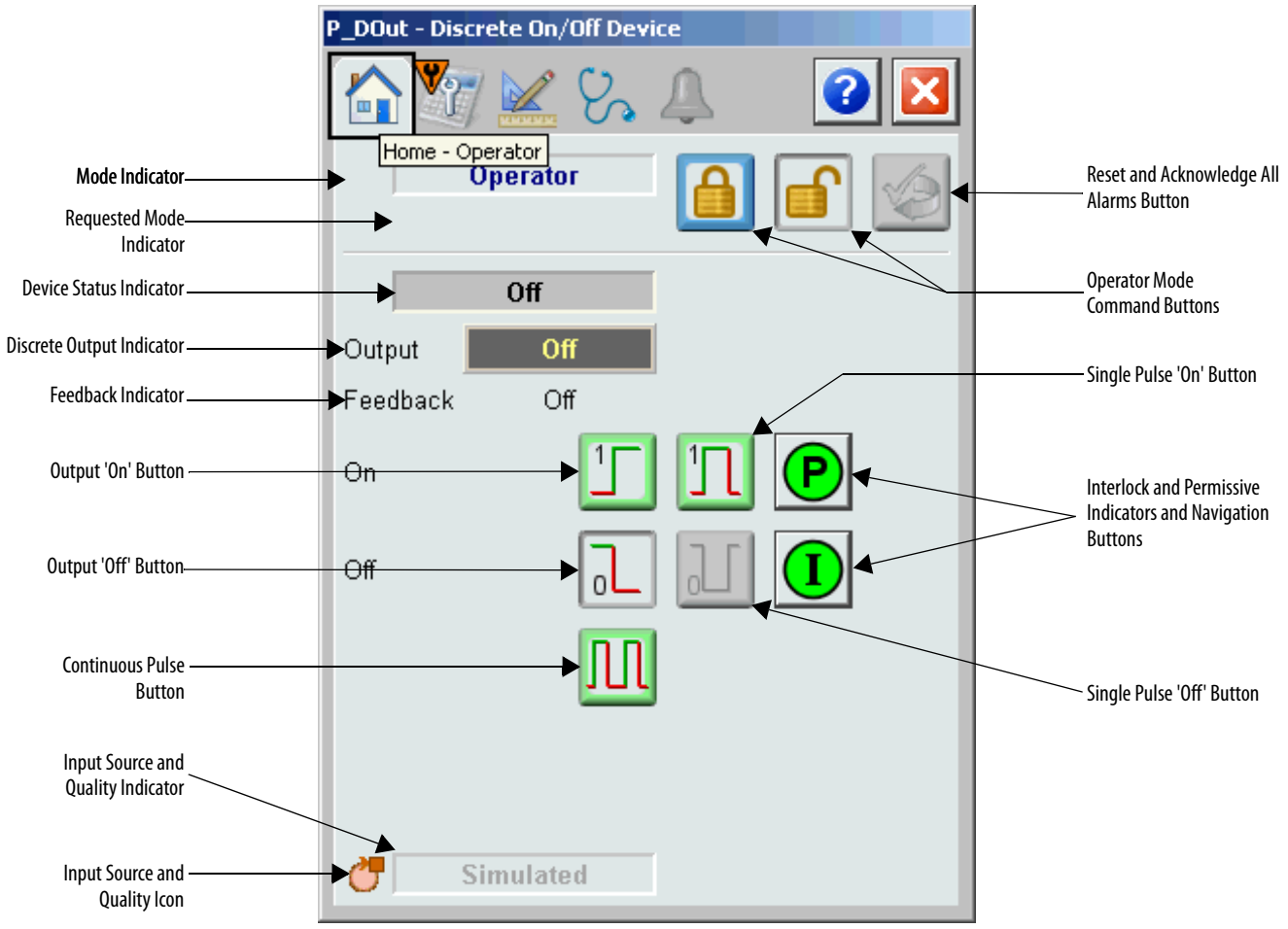
The faceplate provides the means for operators, maintenance personnel, and others to interact with the P_DOut instruction instance, including viewing its status and values and manipulating it through its commands and settings.

Operator Tab

The Faceplate initially opens to the Operator ('Home') tab. From here, an operator can monitor the device status and manually operate the device when it is in Operator mode.

The Operator tab shows the following information:

- Current mode (Operator, Program, Override, Maintenance, or Hand)
- Requested Modes indicator (Appears only if the Operator or Program mode has been superseded by another mode)
- Interlock and Permissive States
- Input Source and Quality indicator (See 'SrcQ' in the Output parameters table on page 16 for details).



The following table shows the functions included on the Operator tab.

Table 9 - Operator Tab Description

Function	Action	Security
	Click to unlock Operator mode. Function unlocks Operator mode, allowing the program to take control.	Manual Device Operation (Code B)
	Click to lock in Operator mode. Function locks the mode in Operator mode, preventing the program from taking control.	
	Click to request Program mode.	
	Click to request Operator mode.	

Table 9 - Operator Tab Description

Function	Action	Security
	Click to command output On. This button is available in Operator or Maintenance mode.	Normal Operation of Devices (Code A)
	Click to command output Off. This button is available in Operator or Maintenance mode.	
	Click to command a continuous pulse stream for the output. This button is available in Operator or Maintenance mode.	
	Click to command a single pulse for the output On. This button is available in Operator or Maintenance mode.	
	Click to command a single pulse for the output Off. This button is available in Operator or Maintenance mode.	
	Click to reset and acknowledge all alarms.	Acknowledge Alarms (Code F)
	Click to open the Interlocks faceplate.	None
	Click to open the Permissives faceplate.	

If the object is configured to have permissive and interlock objects (for example, Cfg_HasIntlkObj is true), the permissive and interlock indication become buttons that open the faceplates of the source objects used as a permissive or interlock (often this is a P_Intlk interlock object or a P_Perm permissive object). If the object is not configured in this way, the permissive or interlock are indicators only.

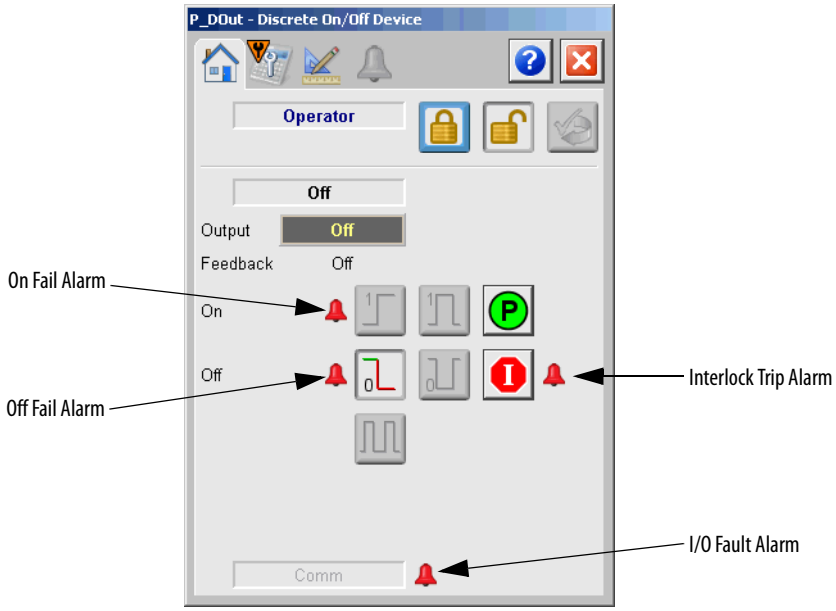
Refer to these publication for more information:

- Rockwell Automation Library of Process Objects: Permissives with Bypass (P_Perm) Reference Manual, publication SYSLIB-RM007
- Rockwell Automation Library of Process Objects: Interlock with First Out and Bypass (P_Intlk) Reference Manual, publication SYSLIB-RM004

One of these symbols appears to indicate the described Interlock or Permissive condition.

Permissive Symbol	Interlock Symbol	Description
		One or more conditions not OK
		Non-bypassed conditions OK
		All conditions OK, bypass active
		All conditions OK

Alarm indicators appear on the Operator tab when the corresponding alarm occurs.



The following table shows the alarm status on the Operator tab.

Table 10 - Operator Tab Alarm Status

Graphic Symbol	Alarm Status
	In Alarm (Active Alarm).
	In Alarm and Acknowledged.
	Out of Alarm but not Acknowledged.
	Alarm Suppressed (by Program logic).
	Alarm Disabled (by Maintenance).
	Alarm Shelved (by Operator)

Maintenance Tab

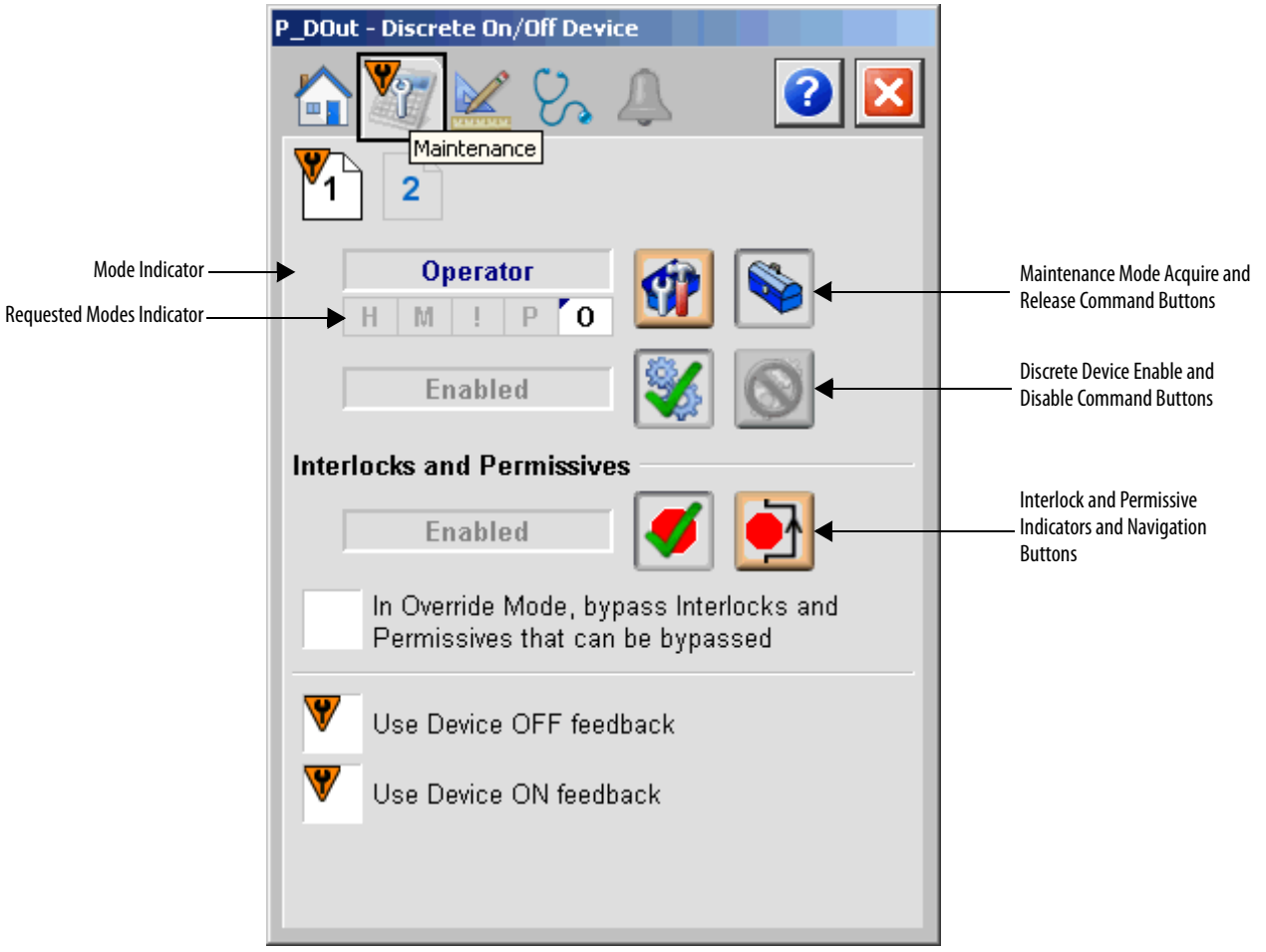
Maintenance personnel use the information and controls on the Maintenance tab to make adjustments to device parameters, troubleshoot and temporarily work around device problems, and disable the device for routine maintenance.

The Maintenance tab has two pages.

Maintenance Tab Page 1

Page 1 of the Maintenance tab shows the following information:

- Current Mode (Program, Operator, or Maintenance).
- Requested Modes indicator - This display highlights all of the modes that have been requested. The leftmost highlighted mode is the active mode.
- Whether Override mode bypasses the bypassable interlocks and permissives.



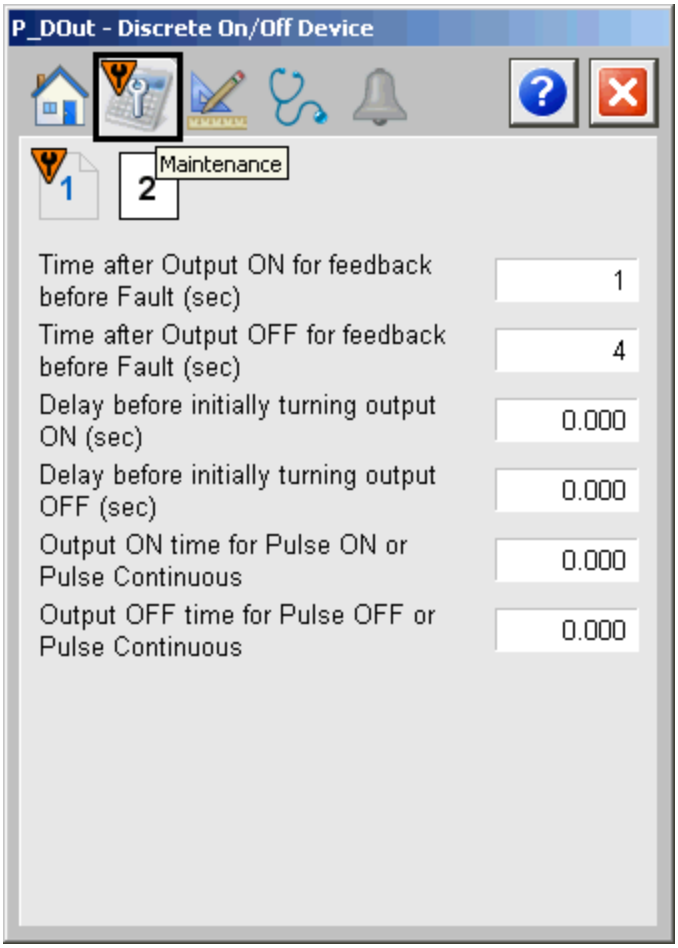
The following table shows the functions on page 1 of the Maintenance tab.

Table 11 - Maintenance Tab Page 1 Description

Function	Action	Security	Configuration Parameters
	Click for Maintenance mode.	Equipment Maintenance (Code C)	None
	Click to release Maintenance mode.		
	Click to enable device.	Equipment Maintenance (Code C)	None
	Click to disable device.		
	Click to enable checking of all interlocks and permissives.	Disable Alarms Bypass Permissives and Interlocks (Code H)	
	Click to bypass checking of bypassable interlocks and permissives.		
In Override Mode, bypass Interlocks and Permissives that can be bypassed	Check if bypassable interlocks and permissives are bypassed in Override mode.		Cfg_OvrdPermIntlk
Use Device OFF feedback	Check if the instruction uses the Off device feedback to check for failure.	Equipment Maintenance (Code C)	Cfg_UseOffFdbk
Use Device ON feedback	Check if the instruction uses the On device feedback to check for failure.		Cfg_UseOnFdbk

Maintenance Tab Page 2

Page 2 of the Maintenance tab page shows the time settings for activating/deactivating the device and output.


P_DOut - Discrete On/Off Device
1
2
Maintenance
Time after Output ON for feedback before Fault (sec)
1
Time after Output OFF for feedback before Fault (sec)
4
Delay before initially turning output ON (sec)
0.000
Delay before initially turning output OFF (sec)
0.000
Output ON time for Pulse ON or Pulse Continuous
0.000
Output OFF time for Pulse OFF or Pulse Continuous
0.000

The following table shows value settings on page 2 of the Maintenance tab.

Table 12 - Maintenance Tab Page 2 Description

Function	Action	Security	Configuration Parameters
Time after Output ON for feedback before Fault (seconds)	Type the amount of time to allow for the device to get feedback for the On setting before setting a fault.	Configuration and Tuning Maintenance (Code D)	Cfg_OnFailT
Time after Output OFF for Feedback before Fault (seconds)	Type the amount of time to allow for the device to get feedback for the Off setting before setting a fault.		Cfg_OffFailT
Delay before initially turning output ON (seconds)	Type the amount of time before the output activates.		Cfg_OnDelayT
Delay before initially turning output OFF (seconds)	Type the amount of time before the output deactivates.		Cfg_OffDelayT

Table 12 - Maintenance Tab Page 2 Description

Function	Action	Security	Configuration Parameters
Output ON time for Pulse ON or Pulse Continuous	Type the amount of time to trigger a pulse when the device activates.	Configuration and Tuning Maintenance (Code D)	Cfg_OnPulseT
Output OFF time for Pulse OFF or Pulse Continuous	Type the amount of time to trigger a pulse when the device deactivates.		Cfg_OffPulseT

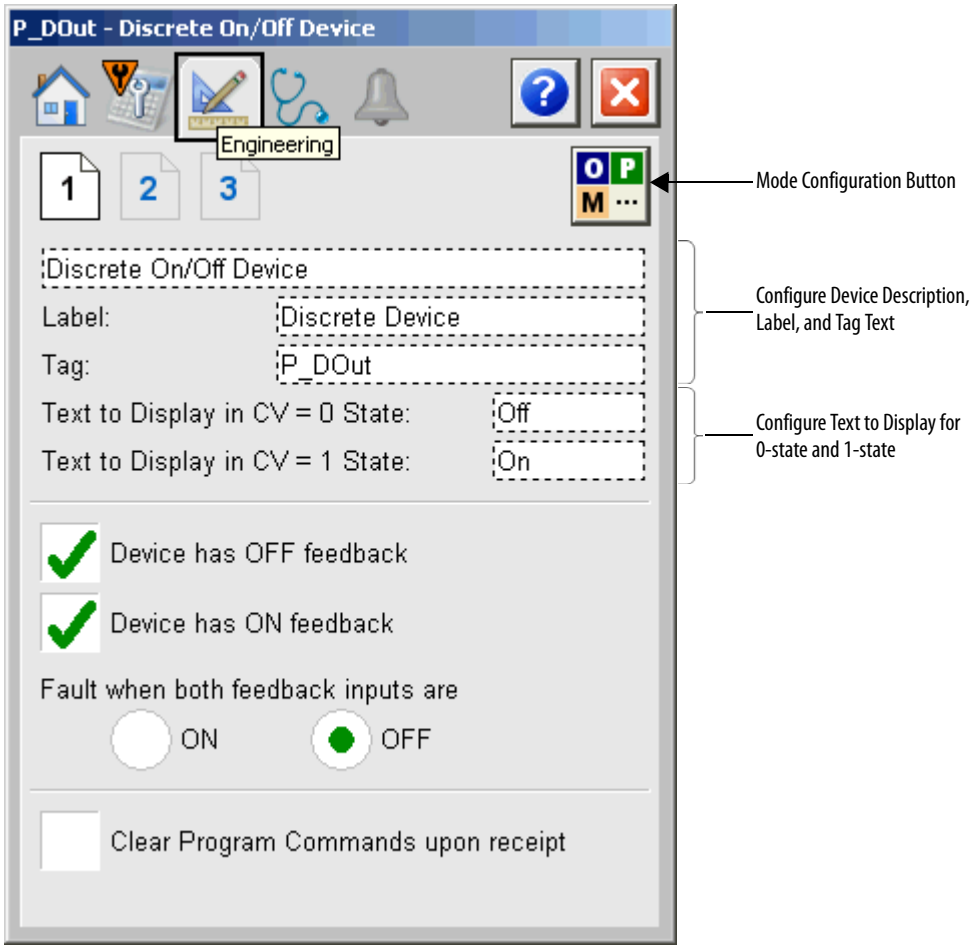
Engineering Tab

The Engineering tab provides access to device configuration parameters and ranges, options for device and I/O setup, displayed text, faceplate-to-faceplate navigation settings, and for initial system commissioning or later system changes.

The Engineering tab has three pages.

Engineering Tab Page 1

On page 1 of the Engineering tab, you can configure textual descriptions and feedback parameters.

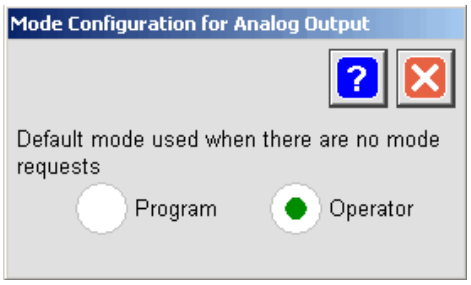


The following table lists the functions on page 1 of the Engineering tab.

Table 13 - Engineering Tab 1 Description

Function	Action	Security	Configuration Parameters
	Click to navigate to the Mode Configuration display.	None	See Mode Configuration display on page 39.
Description	Type the device description to show on the Faceplate title bar.	Engineering Configuration (Code E)	Cfg_Desc
Label	Type the label to show on the Graphic Symbol.		Cfg_Label
Tag	Type the tag name to show on the Faceplate title bar and in the Tooltip. **TIP:** Pausing the mouse over these fields displays a tool tip with the configured Logix tag/path.		Cfg_Tag
Text to Display in CV = 0 State	Type text that displays when the Current Value state is either set to 0 or 1.		Cfg_0StText
Text to Display in CV = 1 State			Cfg_1StText
Device has OFF feedback	Check to configure the instruction to use On or Off feedback signals from the device.		Cfg_HasOffFdbk
Device has ON feedback			Cfg_HasOnFdbk
Fault when both feedback inputs are: ON	Click to Enable fault when both feedback inputs are ON.		Cfg_FdbkFail
Fault when both feedback inputs are: OFF	Click to Enable fault when both feedback inputs are OFF.		
Clear Program Commands on Receipt	Check to set this parameter to the following: • ON to use Edge-triggered Program Commands (default). • OFF to use Level-triggered Program Commands.		Cfg_PCmdClear

Mode Configuration Display



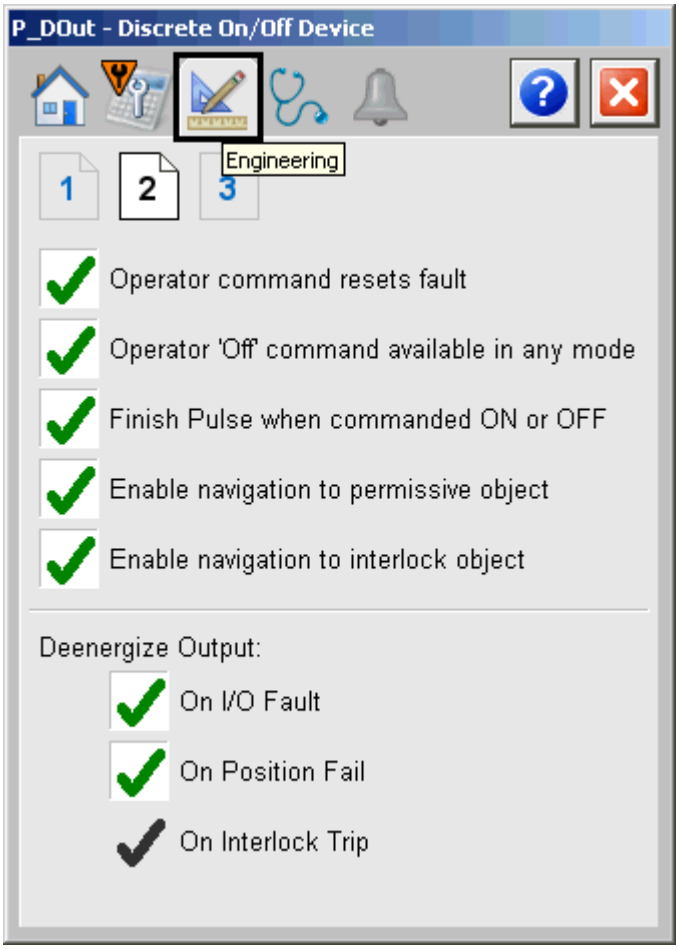
This display lets you select the default mode for the object by selecting the appropriate mode.

IMPORTANT If no mode is being requested, changing the default mode changes the mode of the instruction.

You must have FactoryTalk View security code E to select the default mode on this display.

Engineering Tab Page 2

On Page 2 of the Engineering tab, you can select operator command options, finish pulse, navigation options, and Deenergize Output.



The following table shows the functions on page 2 of the Engineering tab.

Table 14 - Engineering Tab Page 2 Description

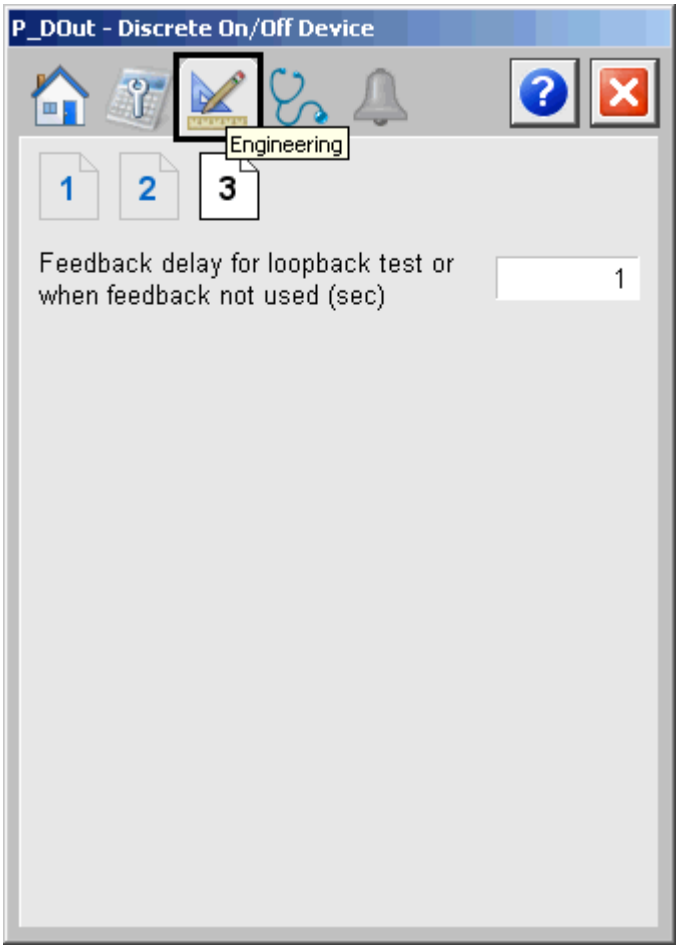
Function	Action	Security	Configuration Parameters
Operator command resets fault	Check to reset a fault upon a operator command. Clear this checkbox to reset faults by using only the reset code.	Engineering Configuration (Code E)	Cfg_OCmdResets
Operator 'Off' command available in any mode	Check to make the Operator Off command available in any mode. Clear this checkbox to make the Operator Off command available only in Operator or Maintenance mode.		Cfg_OperOffPrio
Finish Pulse when commanded ON or OFF	Check to finish pulse when commanded ON or OFF.		Cfg_CompletePulse

Table 14 - Engineering Tab Page 2 Description

Function	Action	Security	Configuration Parameters
Enable navigation to permissive object	Check if a permissive instruction is used with this device. This changes the Permissive indicator to a clickable button to open the Permissive faceplate. **IMPORTANT**: The name of the Permissive object in the controller must be this object's name with the suffix '_Perm'. For example, if your P_DOut object has the name 'DOut123', then its Permissive object must be named 'DOut123_Perm'.	Engineering Configuration (Code E)	Cfg_HasPermObj
Enable navigation to interlock object	Check if an interlock instruction is used with this device. This changes the Interlock indicator to a clickable button to open the Interlock faceplate. **IMPORTANT**: The name of the interlock object in the controller must be this object's name with the suffix '_Intlk'. For example, if your P_DOut object has the name 'DOut123', then its interlock object must be named 'DOut123_Intlk'.		Cfg_HasIntlkObj
Deengerize Output: on I/O Fault	Check to deenergize the output to the device, returning it to its fail position, when an I/O Fault condition occurs. Clear this checkbox to keep the output to the device in its current stat on an I/O Fault condition. **IMPORTANT:** If a condition is configured to shed the device to the Off state on a fault, a reset is required to clear the shed fault to command the device to a state other than Off.		Cfg_ShedOnIOFault
Deengerize Output: on Position Fail	Check to deenergize the output to the device, attempting to return it to its fail position, when a Position Fail condition occurs. Clear this checkbox to keep the output to the device in its current state (keep trying) on a Position Fail condition. **IMPORTANT:** If a condition is configured to shed the device to the Off state on a fault, a reset is required to clear the shed fault to command the device to a state other than Off.		Cfg_ShedOnFail
Deengerize Output: on Interlock Trip	The device outputs are always deenergized on an Interlock Trip. This item cannot be unchecked. It is displayed as a reminder that the Interlock Trip function always deenergizes the device.		None

Engineering Tab Page 3

On Page 3 of the Engineering tab, you can set the feedback delay.



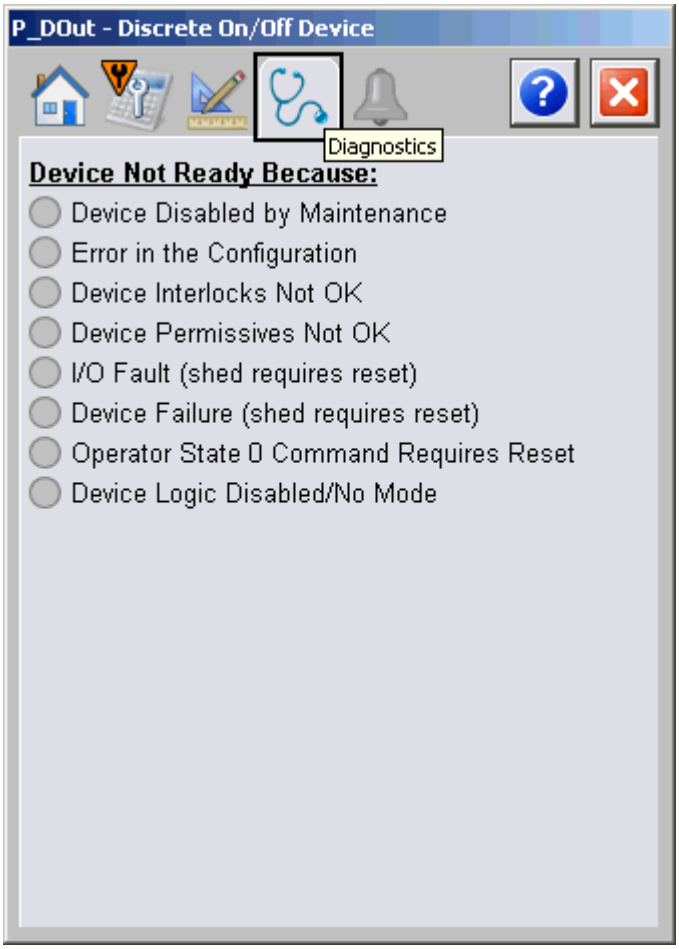
The following table shows the functions on page 3 of the Engineering tab.

Table 15 - Engineering Tab Page 3 Description

Function	Action	Security	Configuration Parameters
Feedback delay for loopback test or when feedback not used (seconds)	Sets the time delay (in seconds) for the On or Off status to be echoed back when Simulation is enabled or when On and Off feedbacks are not used.	Engineering Configuration (Code E)	Cfg_SimFdbkT

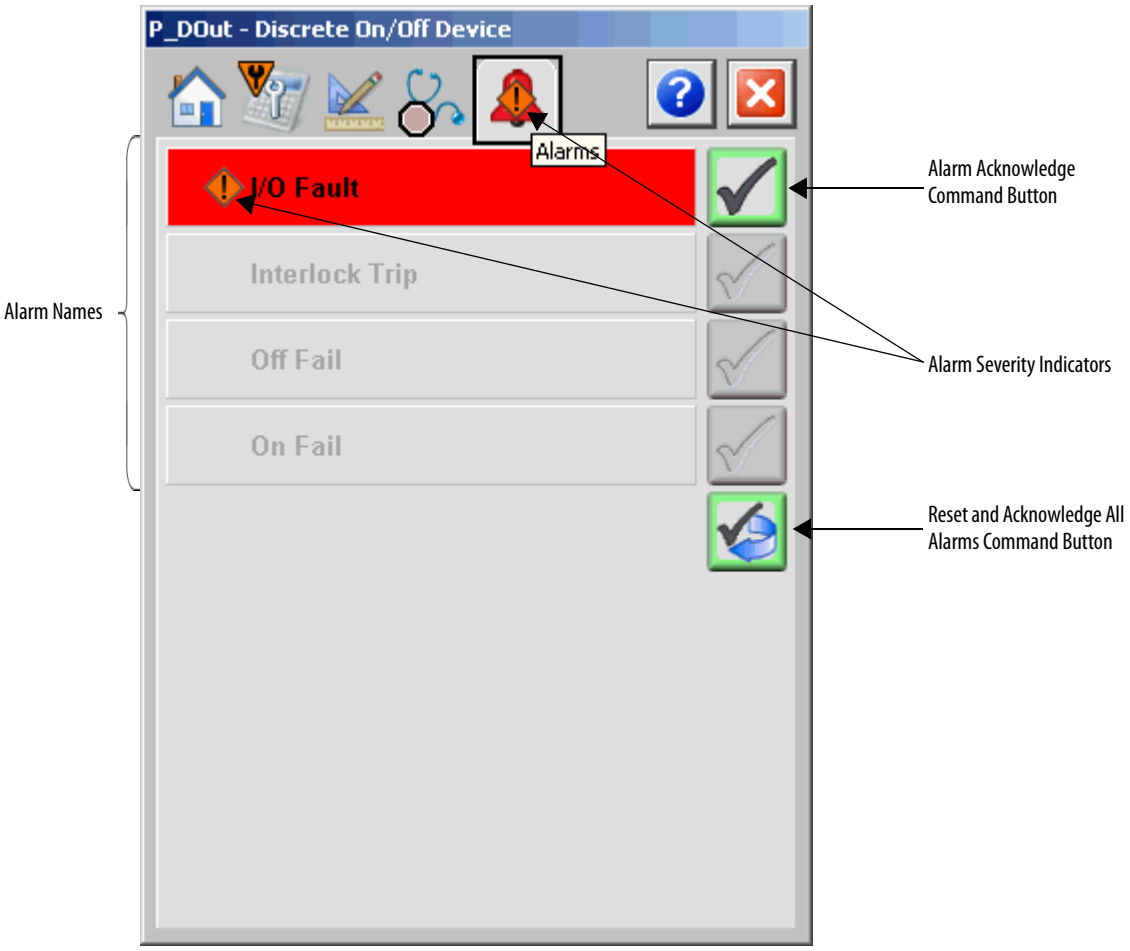
Diagnostics Tab

The Diagnostic tab provides indications helpful in diagnosing or preventing device problems, which could include specific reasons a device is 'Not Ready', device warnings and faults, warning and fault history, and predictive/preventive maintenance data.


P_DOut - Discrete On/Off Device
Diagnostics
Device Not Ready Because:
Device Disabled by Maintenance
Error in the Configuration
Device Interlocks Not OK
Device Permissives Not OK
I/O Fault (shed requires reset)
Device Failure (shed requires reset)
Operator State 0 Command Requires Reset
Device Logic Disabled/No Mode

Alarms Tab

The Alarms tab displays each configured alarm for the P_DOut instruction. The icon on the tab for the alarms page changes color based on the current active alarms. A blinking alarm icon indicates that one or more alarms must be acknowledged or the device must be reset.



Click an alarm name to open the P_Alarm faceplate for that alarm. From the P_Alarm faceplate, you can configure and perform additional operations on the alarm.

If an alarm is active, the panel behind the alarm changes color to match the severity of the alarm. The color of the bell icon at the top of the faceplate shows the highest active alarm's severity, and the icon blinks if any alarm is unacknowledged or requires reset.

Table 16 - Alarm Severity Color Definitions

Color	Definition
Magenta	Urgent
Red	High
Yellow	Medium
Blue	Low
Background (light gray)	No alarm

The following table shows the function on the Alarms tab.

Table 17 - Alarms Tab Description

Function	Action	Security
	Click to acknowledge the alarm.	Acknowledge Alarms (Code F)
	Click to reset and acknowledge all alarms.	
Alarm Name	Click an alarm name to open the corresponding Alarm faceplate.	

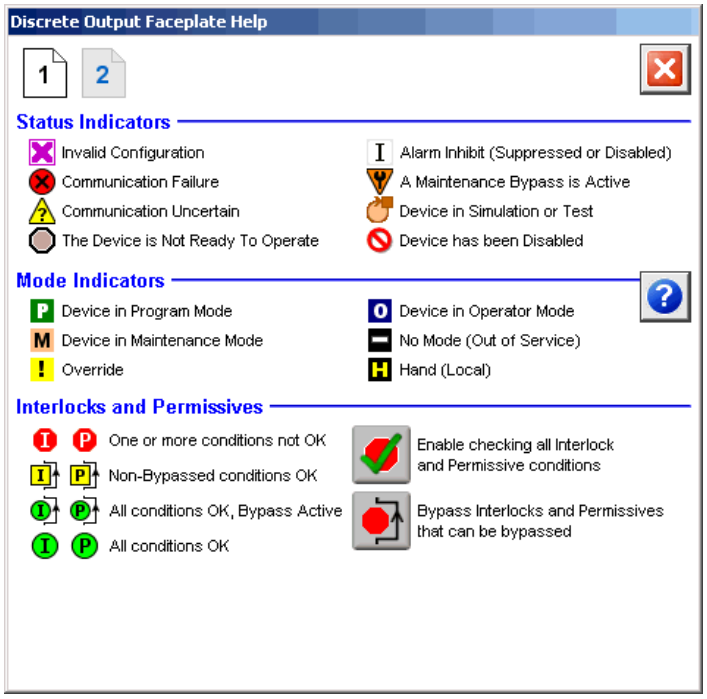
The Reset and Acknowledge All Alarms button is enabled, the panel behind the alarm blinks, and the Alarm Acknowledge button is enabled if the alarm requires acknowledgment. Click the button with the checkmark to acknowledge the alarm.

Refer to the Rockwell Automation Library of Process Objects: Common Alarm Mode (P_Alarm) Reference Manual, publication SYSLIB-RM002, for more information.

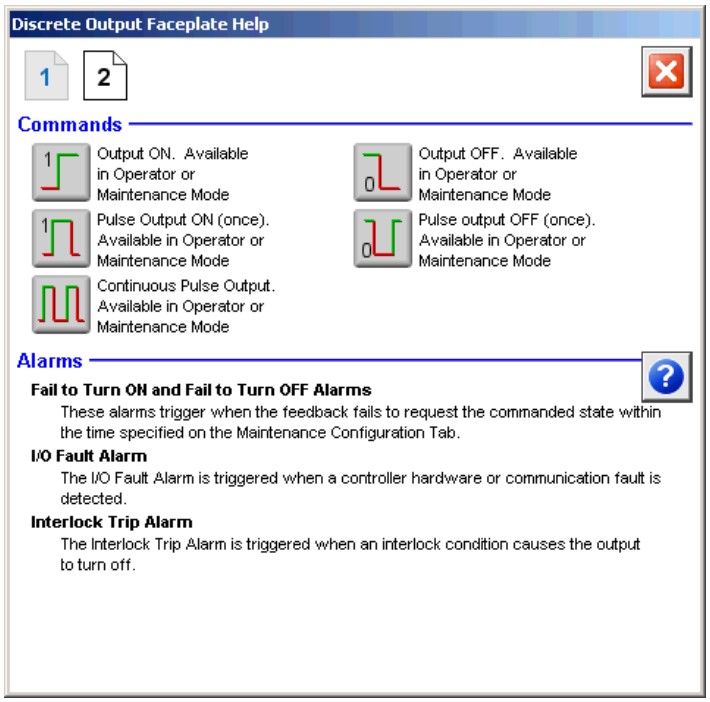
Discrete Output Faceplate Help

The Faceplate Help is divided into two pages.

Faceplate Help Page 1



Faceplate Help Page 2


Discrete Output Faceplate Help
1
2
Commands
Output ON. Available in Operator or Maintenance Mode
Output OFF. Available in Operator or Maintenance Mode
Pulse Output ON (once). Available in Operator or Maintenance Mode
Pulse output OFF (once). Available in Operator or Maintenance Mode
Continuous Pulse Output. Available in Operator or Maintenance Mode
Alarms
Fail to Turn ON and Fail to Turn OFF Alarms
These alarms trigger when the feedback fails to request the commanded state within the time specified on the Maintenance Configuration Tab.
I/O Fault Alarm
The I/O Fault Alarm is triggered when a controller hardware or communication fault is detected.
Interlock Trip Alarm
The Interlock Trip Alarm is triggered when an interlock condition causes the output to turn off.

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